Shahed-238 / Geran-3

Iranian / Russian Jet-Powered One-Way Attack Drone

Attacker Platform Data Card — Air Domain — Jet-Powered Loitering Munition

Image Source: Ukrainian DIU (Defence Intelligence of Ukraine) public releases — search "Geran-3" on DIU Telegram or mil.in.ua; Iranian IRGC state media (November 2023 exhibition); Wikimedia Commons "Shahed 238". Verify rights before use for Iranian state media imagery.

1. IDENTITY & DESIGNATION

Official Designation (Iranian): Shahed-238

Russian Service Designation: Geran-3 (Russian: Герань-3, literally Geranium-3)

Manufacturer (Iranian): HESA — Iran Aircraft Manufacturing Industrial Company; Shahed Aviation Industries

Russian Production: Alabuga Special Economic Zone, Tatarstan, Russia — operated by company Albatross; production began with Iranian-supplied kits, transitioning to domestically manufactured airframes

Country of Origin: Iran (design origin); Russia (Geran-3 production variant)

Year Introduced: First revealed September 2023 (Iranian state TV documentary trailer); publicly unveiled November 2023 at IRGC aerospace exhibition attended by Supreme Leader Khamenei; first confirmed combat use

June 2025 (Iraq); first confirmed Ukraine deployment July 2025

Also Known As: Geran-3 (Russian service); M-237 (referenced in February 2024 Iranian document on Russian UAV purchases)

2. CLASSIFICATION

Domain: Air

Category: Military — One-Way Attack UAV / Loitering Munition

Sub-Category: Jet-powered expendable kamikaze drone; convergence platform — operationally functions as a cruise missile

Terminal Mode: Expendable — kamikaze dive or direct impact

Expendable: Yes

Mission: Precision strike against fixed infrastructure, mobile military assets, and air defense suppression (SEAD variant)

3. PHYSICAL SPECIFICATIONS

Takeoff Weight: Approximately 380 kg — significantly heavier than Shahed-136 (~250 kg)

Length: Approximately 3.5 meters

Wingspan: Approximately 3.0 meters

Airframe: Delta-wing configuration — same planform as Shahed-136 but modified for jet intake; three variants displayed in black color scheme at November 2023 IRGC exhibition —

whether black is radar-absorbent material (RAM) or night-operations paint is unconfirmed

Warhead: 50 to 300 kg depending on variant and configuration; thermobaric warhead options confirmed observed; baseline configuration comparable to Shahed-136 warhead class

Radar Cross-Section: Estimated approximately 0.05 square meters — low-observable airframe geometry

Acoustic Signature: High-pitched turbojet sound — distinctly different from Shahed-136 propeller hum; complicates acoustic detection systems calibrated for propeller-driven threats (Ukraine's Sky Fortress acoustic network)

4. PROPULSION & PERFORMANCE

Propulsion Type: Turbojet engine — Iranian variants use Toloue-10 or Toloue-13 micro-turbojet (unlicensed copies of Czech PBS TJ100 and TJ150); Geran-3 wreckage confirmed PBS TJ150 engine

Engine Thrust: Toloue-13: up to 1,500 Newtons thrust

Cruise Speed (Actual Recorded): 300–350 km/h — Ukrainian forces have recorded actual Geran-3 cruise speed at this range; drones accelerate to maximum speed only in the terminal phase or when Ukrainian air defenses are detected along the route

Max Speed (Terminal / Dive): 500–600 km/h claimed by Iran; up to 800 km/h claimed by

Russian sources during terminal dive; 515+ km/h confirmed by Ukrainian intercept above Kyiv June 10, 2025

Operational Range: Approximately 1,200 km standard operational estimate; up to 2,500 km assessed for lighter payload configuration

Endurance: Approximately 2 hours at cruise power

Launch Method: Truck-mounted rail launch; solid-fuel JATO booster-assisted launch; air-launched variants suggested in Russian sources but not confirmed operationally as of mid-2025

> ⚠ ***PETER NOTE:*** *The cruise speed finding is operationally critical and underreported. The Geran-3 was initially assessed as a near-impossible intercept target at 500–600 km/h. Ukrainian combat experience showed the actual cruise speed is 300–350 km/h — within range of the Sting and other electric interceptors. The drone only goes fast when it senses Ukrainian air defenses nearby. That behavioral pattern is itself an intelligence indicator: when the Geran-3 accelerates, it has detected something. Ukraine's interception of the first Geran-3 by a Wild Hornets Sting on November 30, 2025, confirmed that at cruise speeds the platform is not invulnerable to low-cost interceptors.*

5. GUIDANCE, NAVIGATION & CONTROL

Control Link: Autonomous — fire-and-forget; no active RF command link in flight

Primary Guidance: GPS / GLONASS inertial navigation system — same architecture as Shahed-136 baseline

Variant 1 — GPS/INS Baseline: Satellite and inertial guidance only; targets fixed infrastructure; cost-optimized configuration

Variant 2 — EO/IR Seeker: Electro-optical / infrared imaging seeker for terminal guidance; enables engagement of moving targets; autonomous heat-seeking or operator-controlled via video feed; confirmed in Iranian exhibition display

Variant 3 — Anti-Radiation / SEAD: Passive radar homing — detects, tracks, and attacks radar emissions; intended for suppression of enemy air defenses; operator-activates on radar source lock

Variant 4 — Active Radar: [VERIFY — fourth variant with active radar seeker reported; operational status unconfirmed]

Fiber-Optic Option: No

Starlink Integration: [VERIFY — Starlink connectivity confirmed on Geran-2 variants by September 2024; whether integrated into Geran-3 is unconfirmed but probable given Geran-2 trajectory]

6. SENSORS & DEFEAT MECHANISM

Primary Defeat: Kinetic impact — warhead detonates on contact or proximity fuze

Target Types: Fixed infrastructure (power plants, substations, fuel depots); mobile military assets (EO/IR variant); air defense radar sites (anti-radiation variant); civilian infrastructure (confirmed in Ukraine operational use)

Multi-Mode Seekers: Three confirmed seeker variants mirror multi-mode terminal guidance architecture of advanced cruise missiles — see Convergence Notes

7. COST & PRODUCTION

Unit Cost: [VERIFY — not publicly confirmed for Geran-3; Geran-2 production cost approximately $70,000–$80,000 at Alabuga as of 2024; Geran-3 likely higher due to jet engine and heavier airframe]

Iranian Supply Terms: Iran offered Russia up to 100 Shahed-238 units per month per leaked 2023 Alabuga documents

Russian Production Status: Geran-3 production established at Alabuga SEZ, Tatarstan; initial production from Iranian-supplied kits; transitioning to domestic airframes with Chinese electronics and foreign-sourced components

Production Scale: Serial number U-36 found on June 2025 wreckage; 138 total Geran-3s confirmed launched by Ukrainian General Staff

through late 2025 — suggesting small-scale production relative to Geran-2 volume

Component Sourcing: Western components confirmed despite sanctions: Czech PBS TJ150 engine; electronics from Intel, Texas Instruments; GNSS components from Tallysman Wireless (Canada); Chinese electronics; components from US, Switzerland, Netherlands, Germany, Canada, Japan, Poland via intermediaries or unauthorized re-export

> ⚠ ***PETER NOTE:*** *The PBS TJ150 finding is another three-source supply chain failure — a Czech commercial turbojet engine enabling a Russian-Iranian kamikaze drone at scale, acquired through sanction evasion channels. This is the same component sourcing pattern documented in the Lancet-3 teardown. The global commercial aviation supply chain keeps feeding both sides of this conflict regardless of export controls. That structural reality is one of the book's core analytical findings.*

8. OPERATIONAL HISTORY

November 2023: Publicly unveiled at IRGC aerospace exhibition; three variants displayed in black scheme; attended by Iranian Supreme Leader Khamenei

January 2024: First reported sighting / possible test launch by Ukraine — not confirmed; no follow-on strikes reported at that time

February 2025: Ukrainian Defence Intelligence (GUR) reports Russia has begun domestic production of Geran-3 at Alabuga SEZ; warns of impending deployment

April–June 2025: Geran-3 sightings confirmed in Odesa and Mykolaiv; wreckage with serial number U-36 discovered in late June; intercept above Kyiv at 515+ km/h June 10, 2025

May 17–18, 2025: Russia launches 273 drones in single night; Geran-3 units assessed among the wave; Ukrainian air defenses intercepted most incoming drones

June 2025: First confirmed international combat use — Geran-3 / Shahed-238 crashes in Iraq during Iran-Israel conflict

July 2025: 138 total Geran-3s confirmed launched (Ukrainian General Staff); sightings confirmed across multiple oblasts

November 30, 2025: Historic first — Wild Hornets Sting intercepts and destroys a Geran-3 jet-powered drone; first confirmed kill of jet-powered Shahed variant by an interceptor drone; filmed by companion drone and published by Wild Hornets

January 11, 2026: Russia deploys Geran-5, a new jet-powered variant with 90 kg warhead, 1,000 km range, and Su-25 air-launch capability — indicating continued development of jet-powered Shahed family beyond Geran-3

9. COUNTERMEASURE VULNERABILITY PROFILE

RF Jamming: LOW — Autonomous fire-and-forget; no active RF command link. RF jamming cannot defeat the platform in flight. GPS spoofing remains the primary electronic countermeasure avenue.

GPS Spoofing: MODERATE — GPS/GLONASS navigation vulnerable to spoofing on baseline variant; EO/IR and anti-radiation variants have terminal guidance modes independent of GPS, reducing spoofing effectiveness in terminal phase.

EMI / EMC Attack: MODERATE — Turbojet propulsion is less susceptible to EMI-induced shutdown than electric motor / ESC systems. Electronics suite uses commercial-grade components (confirmed by component analysis) without full MIL-STD hardening, but mechanical propulsion continues through EMI events that would crash an electric drone.

Laser DEW: MODERATE — At 300–350 km/h cruise speed, laser dwell time is reduced but not eliminated. Terminal phase acceleration to 500–600 km/h makes laser engagement in the final approach very difficult.

Kinetic Intercept: MODERATE — At cruise speed (300–350 km/h) the Geran-3 is within intercept range of the Sting and comparable electric interceptors; confirmed by November 30, 2025 kill. At maximum speed (500–600 km/h) it outpaces most interceptor drones currently

deployed. SHORAD gun systems face geometry and reaction-time challenges at jet speeds.

Acoustic Detection: LOW EFFECTIVENESS — Jet turbine acoustic signature differs from propeller-driven Shahed-136; acoustic networks calibrated for propeller hum (Ukraine's Sky Fortress) require recalibration for turbojet frequency range. Detection range reduced at jet speeds.

Thermal Detection: MODERATE VULNERABILITY — Turbojet produces significantly larger thermal signature than piston engine; EO/IR-guided interceptors can acquire the Geran-3 at greater range than Geran-2. This is the thermal vulnerability offset noted by Ukrainian analysts.

Overall Vulnerability Rating: MODERATE — Faster and harder to intercept than Shahed-136/Geran-2 at maximum speed; more thermally visible due to jet engine; operationally proven intercept-able at cruise speeds by electric interceptor drones as of November 2025.

10. CRUISE MISSILE CONVERGENCE NOTES

The Shahed-238 / Geran-3 does not approach the cruise missile threshold — it crosses it. A jet-powered, GPS/INS-guided, fire-and-forget expendable munition with multi-mode terminal seekers (EO/IR, anti-radiation, active radar options) and a 1,200 km operational range is a cruise missile by every functional metric, regardless of its origin as a drone derivative.

The progression from Shahed-136 to Shahed-238 mirrors precisely the historical evolution of cruise missile technology: piston-to-jet propulsion, single-mode to multi-mode guidance, ISR payload to warhead payload, limited range to operational range. Iran and Russia have recreated the cruise missile development arc in approximately two years using commercial components and drone manufacturing infrastructure.

The three confirmed seeker variants — GPS/INS, EO/IR, and anti-radiation — replicate the multi-mode terminal guidance architecture found in advanced cruise missiles including Tomahawk DSMAC and Block IV variants. The anti-radiation variant is particularly significant: a SEAD-capable drone at $70,000–$80,000 per unit represents a cost collapse in the suppression-of-enemy-air-defenses mission that previously required aircraft or dedicated anti-radiation missiles costing orders of magnitude more.

> ⚠ ***PETER NOTE:*** *I spent years working on cruise missiles that cost $1–$2 million per unit and were designed to do exactly what the Geran-3 anti-radiation variant does at a fraction of the cost. The convergence thesis is not a prediction — it is a description of what already happened. The Geran-3 is the convergence thesis in hardware. When the Wild Hornets Sting — a $2,500 interceptor built by 25 engineers with 3D printers — killed a Geran-3 on November 30, 2025,*

> *you had a $2,500 drone defeating a platform that would have been classified as a cruise missile by any defense establishment twenty years ago. That engagement belongs in the first chapter of every future defense acquisition document.*

11. SOURCES & CROSS-REFERENCES

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Cross-Ref: Shahed-136 / Geran-2 (piston-engine predecessor); Wild Hornets Sting (first confirmed interceptor kill of Geran-3, November 30, 2025); General Chereshnya Bullet (companion interceptor); Geran-5 (next-generation jet variant, air-launched, January 2026); Tomahawk BGM-109 (cruise missile convergence comparison); JEDI Shahed Hunter (radar-cued interceptor designed for this threat tier)